

Claims

1. A sensor and print-head (2) assembly comprised in a housing (1) for a hand-held and hand-operated printing device controlled by a processor (4, CPU) connected to at least one first electronic memory (R1), comprising at least one sensor means (S0, S1), a print-head array (60), input means (6) on said housing (1) connected to said processor (4, CPU) for
5 input of assembly control commands, and means for keeping track of the assemblies and print-heads position on a print medium, **characterized** in that said processor (4, CPU) is provided a connection to a hardware control arrangement, said arrangement comprising a programmable logic means (PLD) connected to at least one second electronic memory (R2),
10 and having input means for receiving measurement signals from said at least one sensor, said logic means (PLD) controlling a print-out from the print-head by computing received signals from said sensors and bitmap information stored in said second memory (R2) upon a command from the processor (4, CPU);

providing a mode where said logic means operates independently from the
15 processor (4, CPU) in controlling a print-head print operation, providing exclusive access rights for said logic means to the second memory (R2);

a further command from said processor (4, CPU) providing a mode where said logic means (PLD) is relieved from controlling said print-head print operation, and thus made signal transparent to the processor (4, CPU); and

20 whereby said at least one second electronic memory (R2) is reachable for storing of information controlled by the processor (4, CPU), thus enhancing the speed of providing data to the print-head for printing operations by allowing the processor (4, CPU) to compute and handle received information in said first electronic memory (R1), thus avoiding contest between operations on said memories (R1, R2).

25 2. An assembly according to claim 1, wherein the print-head is of the ink-jet type with spray nozzles.

3. An assembly according to claim 2, wherein the nozzles are comprised in an array where each nozzle is addressed by a binary number, and whereby a fictive nozzle is used to calculate a change of position in an x and y direction for the array on a print medium
30 as a function of the angle of rotation of the array.

4. An assembly according to claims 1-3, wherein a look-up table/tables comprises sine and cosine values for sensor steps with a predetermined resolution between sensor steps, one of said sensor steps determining a minimum movement of the assembly.

5. An assembly according to claim 4, wherein the table/tables are provided integer values, which are obtained by multiplication of the "real" values with a suitable power of 2, and whereby other values stored and used for calculations are correspondingly scaled.

6. An assembly according to claims 2-5, wherein the number of binary bits in a designation are 7, thus addressing 127 nozzles, said fictive nozzle being 128, calculating the address to the bitmap in the second memory (R2), where p is the width of a bitmap, as $y_0 * p + n/128 * \Delta y_{128} * p + ((x_0 + n/128 * \Delta x_{128}) \text{ div } B)$ and the designation of the bit in the bitmap as $(x_0 + n/128 * \Delta x_{128}) \text{ mod } B$.

7. An assembly according to claim 6, wherein the bitmap resides in the upper left corner of a maximum sized memory area for a possible bitmap in the second memory (R2), whereby the value of p is an multiple of two, thus reducing calculations to be made.

8. An assembly according to claims 2-7, wherein the number of nozzle No. n is indicated by a counter, which is incremented when the preceding nozzle has accomplished its task.

9. An assembly according to claims 1-8, wherein a position is expressed through the coordinates of the sensor means and the angle between the prior position and the current position of the sensor means.

10. An assembly according to claims 2-9, wherein the print-head nozzle position is computed from the knowledge of the position of one sensor means and the tilt angle of the assembly, by calculating the position of the first and last nozzle in said array.

11. An assembly according to claim 10, wherein remaining nozzle positions are computed by starting from the first nozzle positions and adding up the difference in x- and y-directions between the nozzles, whereby the x- and y-distance between the first and last nozzle is divided by the number of nozzles.

12. An assembly according to claims 1-11, wherein a positioning means is provided to position the assembly in a correct starting position in relation to the print medium.